

of the storm was something unparalleled in the annals of Nashville.

March 12.—High winds at Buffalo and vicinity caused some damage to movable property and frail structures.

March 13.—Another severe hailstorm swept over a narrow path about 200 miles long and probably 5 to 10 miles wide, extending from Fayette County, in the southwestern part of Tennessee, to Smith County, in the east-central part. The towns of Somerville, Bolivar, Decaturville, Centerville, Franklin, Laverne, Hendersons Crossroads, and Watertown were damaged to a greater or less extent. A smaller storm traversed the counties of Lincoln, Moore, and Coffee, in the southern part of the State, and losses to buildings in the vicinity of Rockhill by severe winds, aggregating \$5,000, were reported.

March 19.—On this date minor tornadoes occurred at widely separated places, viz, near Salina, Kans., about 6 p. m., 90th meridian time; near Durant, Iowa, about 4 p. m., 90th meridian time. The area of low pressure was almost directly east of both of these localities. High winds swept over southeastern Louisiana and southwestern Mississippi early in the morning of the 19th. In two cases the evidence seems to point to tornadic action, viz, in the suburbs of Jackson, Miss., and near Utica, Miss. At the latter place 4 persons were killed and 1 injured. Property loss at both places, about \$5,000.

March 22.—A minor tornado passed over Arlington, Ga., at 8.30 a. m., wrecking the Arlington Academy, killing 8 of the pupils and injuring 8 others. But little damage was done outside of that building. Total property loss, about \$6,000.

March 28.—A general rain and wind storm prevailed over central and southern Texas, the wind being particularly destructive at Austin and Calvert, where, it is estimated, a property loss to the extent of \$15,000 was sustained. The loss to railroads on account of washouts and damages to culverts and bridges was also very great.

March 30.—The first severe and destructive tornado of the year occurred at Chandler, Okla., at about 5.30 p. m., 90th meridian time. Fourteen persons were killed and 40 more or less injured. In answer to a request for information as to the character of this storm, a correspondent writes:

As near as I can describe, I would compare it with a stream that is very much swollen with heavy rain, the main current going northeast with whirlpools all over its surface; some of the trees and buildings were apparently mashed flat, others were scattered over large territory; some in the track were lying north, while beside them, or probably across them, would be one lying south, and at times there were places where they lay in all directions in a space of a hundred feet. One place in particular I noticed to-day, the first tree was torn up by the roots and lay with its top west; across that, was one broken off with the top north, and across these two was one with the top east, while a few feet away was one with the top south. This occurred at numerous places. In many places it seemed that shoots would go off to one side and literally rip up the trees with a whirling motion, and finally cease, or the track would be lost. The main storm seemed to keep straight along on the ground and was very destructive. I have no idea of the damage, the storm simply wiped the town of buildings with the exception of probably fifteen, and they were more or less injured. The town was about a mile long and probably not over a quarter wide, and the storm struck it about the center.

Another correspondent, after consulting with conservative business men of the town, estimates the property loss at \$100,000. The path of greatest destruction was nearly half a mile wide and at least 10 miles long. How much farther it extended is not known.

March 31.—A tornado passed through portions of Cleveland and Lincoln counties, south-central Arkansas, and a less destructive storm visited Jackson County. Details of both storms are awaited.

Deaths by tornado during January, February, and March, 32; by less violent windstorms, 11; total, 43. Deaths by lightning, 14.

## TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

Both the mean temperatures and the departures from the normal are given in Table I for the regular stations of the Weather Bureau, which also gives the height of the thermometers above the ground at each station. The mean temperature is given for each station in Table II, for voluntary observers.

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean temperature* of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *highest mean temperatures* were: Key West, 76.5; Jupiter, 73.2; Corpus Christi, 69.2; Port Eads, 66.4. In Canada, Yarmouth, 31.3; Halifax, 29.8; Sydney, 27.0; St. Johns, N. F., 25.4. The lowest were: Williston, 7.8; Havre, 10.9; Bismarck, 11.8; Moorhead, 15.2; Helena, 15.4. In Canada, Battleford, 3.8; Qu'Appelle, 5.4; Medicine Hat, 6.9; Winnipeg, 7.8.

As compared with the normal for March the mean temperature for the current month was in excess throughout the country east of the Mississippi, but was deficient in the upper Missouri Valley, the Rocky Mountain and Pacific Coast regions. The greatest excesses were: In the United States, New Orleans, 6.9; Jacksonville, 6.8; Mobile, 6.7; Tampa, 6.1. In Canada, Toronto, 5.3; Port Arthur, 4.6; Rockliffe, 4.4; Port Stanley, 4.3; Kingston, 4.1. The largest deficits were: Williston, 17.1; Miles City, 15.4; Helena, 12.6; Bismarck, 12.4; Havre, 10.9. In Canada, Edmonton, and Medicine Hat, 16.6; Calgary, 16.4; Swift Current, 16.1.

Considered by districts the mean temperatures of the current month show departures from the normal as given in Table I. The greatest positive departures were: Florida Peninsula, 4.4; east Gulf, 5.5. The greatest negative departures were: North Dakota, 11.6; northern Slope, 9.0; middle Plateau, 8.5.

In Canada.—Prof. R. F. Stupart says:

The most marked feature of the month was the unusually low temperature which prevailed in the Northwest Territories and British Columbia. In parts of Assiniboia the mean for the month was as much as 20° below average, and in British Columbia it was from 3° to 10° below. Passing eastward in Manitoba, these abnormal conditions became less pronounced; at Winnipeg the average was just maintained, and at the more easterly stations in that province and north of Lake Superior the departure was above instead of below average. In Ontario and Quebec it was from 2° to 5° above, and in the Maritime Provinces differences nowhere great were at some points slightly in excess and at others slightly below the average. (Canadian Weather Map, March, 1897.)

The years of highest and lowest mean temperatures for March are shown in Table I of the REVIEW for March, 1894. The mean temperature for the current month was the highest on record at: Jupiter, 73.2; New Orleans, 69.4; Corpus Christi, 69.2; Jacksonville, 68.8; Pensacola, 66.3; Mobile, 66.2; Montgomery, 63.0; Fort Smith, 54.6. The mean temperature was the lowest on record at: Williston, 7.8; Havre, 10.9; Bismarck, 11.8; Miles City, 15.4; Helena, 21.4; Idaho

Falls, 22.8; Baker City, 28.8; Winnemucca, 31.8; Spokane, 32.8; Salt Lake City, 33.6; Carson City, 33.9; Port Angeles, 38.2; Tatoosh Island, 39.0; Portland, Oreg., 40.5; Fort Canby, 40.9; Astoria, 41.6; Eureka, 45.2; Point Reyes Light, 46.8; Red Bluff, 47.9; Fresno, 48.6; San Francisco, 48.9; Phoenix, 54.3.

The *maximum and minimum temperatures* of the current month are given in Table I. The highest maxima were: 92, Corpus Christi (21st), San Antonio (30th); 88, Tampa (16th), Jacksonville (20th), Jupiter (23d); 87, Augusta (21st); 86, Savannah, Jacksonville, and Shreveport (20th), Charleston, (21st), Yuma (25th), Vicksburg (30th). The lowest maxima were: 42 Duluth (21st); 46, Havre (28th), Eastport (30th); 47, Williston (29th); 48, Idaho Falls (25th), Bismarck (29th); 49, Northfield (19th), Block Island and Marquette (29th). The highest minima were: 65, Key West (28th); 51, Galveston (23d); 50, Tampa (1st), Port Eads, (frequently), New Orleans (25th); 49, Jupiter (27th). The lowest minima were: -41, Havre (13th); -36, Bismarck (15th); -35, Williston (14th); -32, Moorhead (15th); -26, Miles City (13th); -25, Huron (14th).

The *limits of minimum temperatures*, 32° and 40°, are shown by lines on Chart No. V.

The *years of highest maximum and lowest minimum temperatures* for March are given in the last four columns of Table I of the REVIEW for 1896. During the current month the maximum temperatures were equal to or above the highest on record at: Corpus Christi, 92; Jacksonville, Tampa, and Jupiter, 88; Vicksburg and Charleston, 86; New Orleans, 84. The minimum temperatures were equal to or below the lowest on record at: Havre, -41; Bismarck, -36; Williston, -35; Moorhead, -32; Miles City, -26; Huron, -25; Northfield, -18; Idaho Falls, -16; Baker City, 0; Carson City, 10; Astoria, 24.

The *greatest daily range of temperature and the data for computing the extreme and mean monthly ranges* are given for each of the regular Weather Bureau stations in Table I. The largest values of the greatest daily ranges were: Havre, 57; Williston, 53; Dodge City, 47; Northfield, 46; Rapid City, 44; Sioux City, Wichita, Pueblo, and El Paso, 43. The smallest values were: Tatoosh Island, 11; Key West, 13; Fort Canby and Point Reyes Light, 14; San Francisco, 15; Astoria and Galveston, 19; Port Eads and Nantucket, 20.

Among the *extreme monthly ranges* the largest were: Havre, 87; Moorhead, 86; Bismarck and Rapid City, 84; Williston, 82; Miles City and Fort Smith, 79; Huron, 77; Concordia, 75. The smallest values were: Key West and Point Reyes Light, 19; San Francisco, 24; Tatoosh Island and Fort Smith, 25; Pysht, 27; Galveston and Port Eads, 28.

*Accumulated monthly departures from normal temperatures* from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column for comparison with the departures of current conditions of vegetation from the normal condition.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
New England.....	+ 3.6	+ 1.2	North Dakota.....	- 8.8	- 2.9
Middle Atlantic.....	+ 2.1	+ 0.7	Northern Slope.....	- 4.6	- 1.5
South Atlantic.....	+ 0.7	+ 0.2	Southern Plateau.....	- 5.7	- 1.9
Florida Peninsula.....	+ 3.9	+ 1.3	Middle Plateau.....	- 8.8	- 2.9
East Gulf.....	+ 2.2	+ 0.7	North Pacific.....	- 2.6	- 0.9
West Gulf.....	+ 5.8	+ 1.9	Middle Pacific.....	- 5.8	- 1.9
Ohio Valley and Tenn....	+ 3.0	+ 1.0	South Pacific.....	- 4.1	- 1.4
Lower Lake.....	+ 3.9	+ 1.3			
Upper Lake.....	+ 7.8	+ 2.6			
Upper Mississippi Valley..	+ 3.3	+ 1.1			
Missouri Valley.....	+ 1.4	+ 0.5			
Middle Slope.....	+ 2.0	+ 0.7			
Southern Slope.....	+ 1.2	+ 0.4			
Northern Plateau.....	+ 3.0	+ 1.0			

## MOISTURE.

The *quantity of moisture* in the atmosphere at any time may be expressed by the weight of the vapor coexisting with the air contained in a cubic foot of space, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-point for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, is given in Table I.

The *rate of evaporation* from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer. The mean wet-bulb temperature is now published in Table I; it is always intermediate, and generally about half way between the temperature of the air and of the dew-point. The quantity of water evaporated in a unit of time from the muslin surface may be considered as depending essentially upon the wet-bulb temperature, the dew-point, and the wind.

The *relative humidity*, or the ratio between the moisture that is present in the air and the moisture that it would contain if saturated at its observed temperature is given in Table I as deduced from the 8 a. m. and 8 p. m. observations. The general average for a whole day or any other interval would properly be obtained from the data given by an evaporimeter, but may also be obtained, approximately, from frequent observations of the relative humidity.

## PRECIPITATION.

[In inches and hundredths.]

The *distribution of precipitation* for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III. The total precipitation for the current month exceeded 10 inches on the coast of Oregon and Washington, as also over a large portion of Arkansas, southern Missouri, Illinois, Indiana, northern Alabama, Mississippi, and the greater part of Georgia and Tennessee; it exceeded 18 inches in the central portion of this region. The rainfall was less than 1 inch in southern Florida and the southern Plateau Region. The larger values for regular stations were: Montgomery, 12.02; Tatoosh Island, 11.31; Astoria, 11.88; Little Rock, 10.43; Memphis, 10.04; Chattanooga, 11.23.

Details as to *excessive precipitation* for March are given in Tables XI and XII.

The *years of greatest and least precipitation* for March are given in the REVIEW for March, 1890. The precipitation for the current month was the greatest on record at: Montgomery, 12.02; Little Rock, 10.43; Cincinnati, 9.89; St. Louis, 8.25; Columbus, Mo., 5.33; Abilene, 4.02; Idaho Falls, 3.84; Minneapolis, 3.05; Carson City, 2.78; Cheyenne, 2.32; Santa Fe, 2.06. It was the least on record at: Tampa, 1.44; Wilmington, 1.23.

The *diurnal variation*, as shown by tables of hourly means of the total precipitation, deduced from the self-registering gauges kept at the regular stations of the Weather Bureau, is not now tabulated.

The *current departures* from the normal precipitation are given in Table I, which shows that precipitation was in excess in the valleys of the Ohio, Tennessee, and Arkansas, as also in Ontario, Canada. The large excesses were: Cincinnati, 6.6; Montgomery, 5.6; Chattanooga and Little Rock, 5.2; St. Louis and Astoria, 4.8; Knoxville, Memphis, and Palestine, 4.2. In Canada, Port Stanley, 1.6; Rockville, 1.4. The large deficits were: Wilmington, 2.7; Hatteras, 2.3; Atlantic City, 1.10. In Canada, Sydney, 1.1; Chatham, 1.0.

The *average departure* for each district is given in Table I. By dividing each current precipitation by its respective normal the following corresponding percentages are obtained (precipitation is in excess when the percentage of the normal exceeds 100):